

Electronic and Photonic Materials

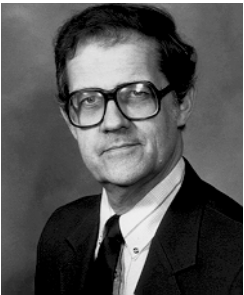


Yung Kee Yeo

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Dr. Yeo's research specializes in the electrical and optical characterization studies of various semiconductors including ion-implanted wide bandgap semiconductors such as GaN and SiC. Professor Yeo has served on the Dept of Engineering Physics faculty since 1984. He has published over 70 articles in archival journals and several technical reports, presented over 150 papers at professional conferences, and holds one patent.



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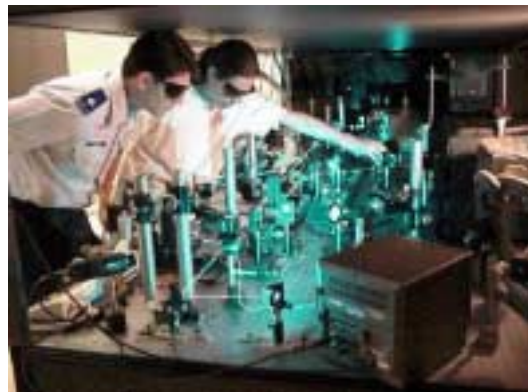
Professor Hengehold's research areas center around experimental solid state physics, semiconductor physics, optical diagnostics and electron and laser spectroscopy. He is the author of over 60 archival publications and over 150 presentations at technical meetings. He has served as advisor on over 15 doctoral dissertations and 75 master's theses.

Research Areas

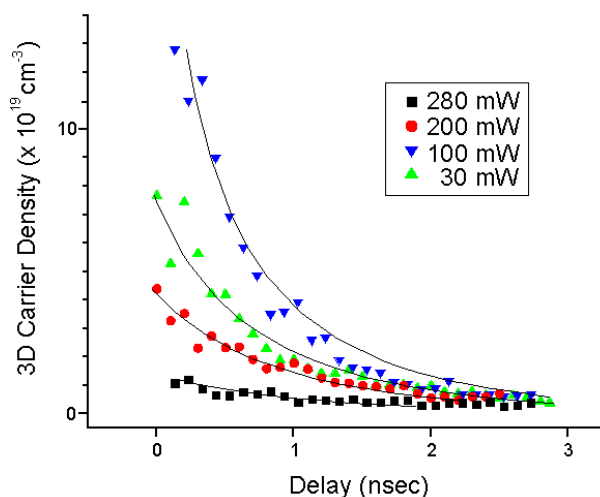
- IR quantum-well structures
- Wide band-gap semiconductors
- Band structure modeling
- Ion implantation studies
- Metallic contact studies
- Si / SiGe superlattice detectors

Recent and Ongoing Research

Active research areas include the application of ultra-fast spectroscopy to determine quantum well carrier dynamics on a sub-nanosecond time scale, numerical simulation to model the electronic and optical properties of quantum well structures, hot-electron photoluminescence spectroscopy to measure quantum well dispersion relations, and Hall effect measurements, deep level transient spectroscopy (DLTS) and cathodo-luminescence measurements to optimize ion implantation and annealing conditions for successful doping of wide-band-gap semiconductors.



Time resolved photoluminescence reveals carrier dynamics on sub-nanosecond time scales.



Radiative recombination dynamics of type II In As / Ga In Sb quantum well lasers.

Facilities

Experimental facilities for optical characterization include photoluminescence, time-resolved photo-luminescence, selective excitation luminescence, cathodo-luminescence, electroluminescence, and absorption spectroscopy systems. Each of our four systems is housed in a separate room and includes an excitation source (krypton, argon ion, femto-second Ti:Sapphire, pulsed nitrogen and dye lasers, and a 100-5000 eV, micro- to milli-amp electron beam system), a low temperature (1.2-300 K) cryostat and detectors covering the ultraviolet to mid-infrared range. Electrical characterization facilities include fully automated, low- and high-temperature Hall-effect and DLTS systems, capacitance-voltage profiling capabilities, and annealing furnaces. A class 10,000 Clean Room is available for materials processing and device fabrication



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Lt Col Marciniak's research interests include the characterization of narrow-gap semiconductors for mid-infrared lasers, coherent phasing of semiconductor lasers, and wide-band-gap semiconductor materials for high-power, high-temperature aerospace applications. He previously evaluated jamming systems at the Air Force Electronic Warfare Center, developed high-power semiconductor lasers at the Air Force Research Laboratory, and managed the Air Force Aerospace Power Technologies Program. Lt Col Marciniak is currently the Deputy Department Head.



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Maj Scott's research interests include optical and electrical characterization of semiconductors with an emphasis on implantation techniques for doping semiconductors. Previously, Major Scott served as a flight test engineer on the B1-B bomber, and as the Technical Director for both simulated nuclear and conventional weapons testing for the Defense Threat Reduction Agency. He also taught physics at the USAF Academy.